

“Lasers in soft material engineering: Laser Direct Writing via Multi Photon Absorption and Laser Induced Forward Transfer”

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In the laser direct writing (LDW) via multi photon absorption (MPA) process, the monomer to be polymerized homogeneously mixed with a photoinitiator and dissolved in a proper solvent is poured on a substrate, in a thin and uniform layer, where a focused femtosecond laser beam is (computer controlled) moved in the sample volume on the desired path and the polymerization occurs just on the followed trajectory. After laser irradiation, the substrate is "developed" for removing the non-irradiated, un-polymerized material (by washing with alcohol and deionized water). 1D, 2D and 3 D structures thus obtained have applications in controlled drug delivery, tissue engineering, flexible electronics, etc.

LIFT has been successfully used for printing patterns of different materials, in solid or liquid phase, in form of pixels with accurately controlled of position, shape and functionalities. The technique is compatible with soft material processing, being successfully applied for transferring biomolecules in microarrays and biosensors, polymers and polymer stacks for sensors, OLED's, etc.